

# Lesson 11: Patterns in Multiplying by Multiples of 10, 100, and 1,000

## Lesson Objectives

- Students will identify patterns in multiplying by multiples of 10, 100, and 1,000 to increase fluency with multiplication problems.

## Instructional Materials

Material	Quantity	Description
How Am I Doing? graph	1 per student	
Colored pencils	1 per student	
Display Masters	1 each	<ul style="list-style-type: none"><li>• Preview: Key Ideas: Multiply by 10, 100, and 1,000</li><li>• Demonstrate: Multiples of 10 A-D</li><li>• Demonstrate: Multiples of 100 A-D</li><li>• Demonstrate: Multiples of 1,000 A-D</li><li>• Demonstrate: Conclusion</li></ul>
Handouts	1 per student	<ul style="list-style-type: none"><li>• Cumulative Review</li><li>• Practice 1</li><li>• Practice 2</li><li>• Independent Practice</li></ul>
Answer Keys	1 each	<ul style="list-style-type: none"><li>• Cumulative Review</li><li>• Practice 1</li><li>• Practice 2</li><li>• Independent Practice</li></ul>

## Cumulative Review

Have students answer the questions on the Cumulative Review handout. Go over the answers. Correct misconceptions. Have students use a colored pencil to make corrections as needed. Collect student papers to determine who needs additional instruction.

## Preview

This lesson will build on students' conceptual knowledge of multiplying by 10. Students will apply this knowledge to identify patterns in multiplying by multiples of 10, 100, and 1,000.

Display and introduce through a brief explanation the key ideas for this lesson:

	Multiply by multiple of 10	Multiply by multiple of 100	Multiply by multiple of 1,000
Product ends in...	0	00	000
Strategy	Find the product of the first factor and the digit in the tens place of the second factor. Add one 0 at the end.	Find the product of the first factor and the digit in the hundreds place of the second factor. Add two 0s at the end.	Find the product of the first factor and the digit in the thousands place of the second factor. Add three 0s at the end.
Example	$\underline{3} \times \underline{50} = \underline{150}$	$\underline{3} \times \underline{500} = \underline{1,500}$	$\underline{3} \times \underline{5,000} = \underline{15,000}$

Use the Key Ideas: Multiply by 10, 100, and 1,000  display master as needed.

## Engage Prior/Informal Knowledge

To open the lesson, present questions and problems to activate students' background knowledge and preskills, such as the following:

Using any strategy for multiplying by 10 that you have learned, solve the following facts:

- $6 \times 10 =$

- $8 \times 10 =$
- $9 \times 10 =$
- $7 \times 10 =$
- $4 \times 10 =$

What do all of the products of these facts have in common?

## Demonstrate

1. Multiply by 10 and multiples of 10.

**Say:** *Today, we will look for patterns in multiplying by multiples of 10, 100, and 1,000.*

**Say:** *We will use a graphic organizer to help us complete each problem and identify patterns. In previous lessons, we learned strategies for multiplying by 10. Today, we will build on those strategies.*

Use the Multiples of 10 A  display master as needed.

**Say:** *Let's begin with the fact 7 times 10. What is the product of 7 and 10? (70)*

Use the Multiples of 10 B  display master as needed.

**Say:** *Now, we need to find the product of 7 and 20. 20 is the product of 10 and 2. We can use the doubling strategy to find the product. We are looking for the sum of  $7 \times 10$  and  $7 \times 10$ . Because we know that  $7 \times 10$  is 70, we are looking for the sum of 70 and 70. What is  $70 + 70$ ? (140)*

Use the Multiples of 10 C  display master as needed.

**Say:** *Let's move on to the product of 7 and 30. If we do not know the product of 7 and 30 automatically, we can continue with the strategy.*

**Say:** *When we multiplied 7 by 3, we learned that this fact could also be written as  $7 + 7 + 7$ . When we multiply 70 by 3, we could rewrite the fact as  $70 + 70 + 70$ . Just as we could count by 7 to get 7, 14, 21, we can count by 70. We start with 70, but what is next? What is  $70 + 70$ ? (140) What is  $140 + 70$ ? (210)*

Complete the table with students.

**Say:** *Now that we have completed the multiples of 10, what do all of the products have in common? What relationship do you see between the factors and the product? (all products end in 0; you can multiply 7 and the digit in the tens place and then add a 0 to get a product; etc.)*

Use the Multiples of 10 D  display master as needed.

2. Multiply by 100 and multiples of 100.

**Say:** *We will continue to use this graphic organizer to help us complete each problem and identify patterns.*

Use the Multiples of 100 A  display master as needed.

**Say:** *Let's begin with the fact 7 times 100. What is the product of 7 and 100? (700)*

Use the Multiples of 100 B  display master as needed. 

**Say:** *Now we need to find the product of 7 and 200. 200 is the product of 100 and 2. We can use the doubling strategy to find the product. We are looking for the sum of  $7 \times 100$  and  $7 \times 100$ . Because we know that  $7 \times 100$  is 700, we are looking for the sum of 700 and 700. What is*



#### TEACHER NOTE

If students do not know the product of 7 and 100, question students, using the base 10 concept. Guide students to understand that they are looking for seven 100s.

$$700 + 700? (1,400)$$

Use the Multiples of 100 C  display master as needed.

**Say:** *Let's move on to the product of 7 and 300. If we do not know the product of 7 and 300 automatically, we can continue with the strategy. Each time, we are adding 7 times 100, which is 700. So, 7 times 300 is 2,100, the product of 7 and 200, plus 700.*

Complete the table with students.

**Say:** *Now that we have completed the multiples of 100, what do all of the products have in common? What relationship do you see between the factors and the product? (all products end in two 0s; you can multiply 7 and the digit in the hundreds place and then add two 0s to get a product; etc.)*

Use the Multiples of 100 D  display master as needed.

3. Multiply by 1,000 and multiples of 1,000.

**Say:** *We will continue to use the graphic organizer to help us complete each problem and identify patterns.*

Use the Multiples of 1,000 A  display master as needed.

**Say:** *Let's begin with the fact 7 times 1,000. What is the product of 7 and 1,000? (7,000)*

Use the Multiples of 1,000 B  display master as needed. 

**Say:** *Now we need to find the product of 7 and 2,000. 2,000 is the product of 1,000 and 2 or the sum of 1,000 and 1,000. We can use the doubling strategy to find the*

 **TEACHER NOTE**

If students do not know the product of 7 and 1,000, question students, using the base 10 concept. Guide students to understand that they are looking for seven 1,000s.

*product. We are looking for the sum of  $7 \times 1,000$  and  $7 \times 1,000$ . Because we know that  $7 \times 1,000$  is 7,000, we are looking for the sum of 7,000 and 7,000. What is  $7,000 + 7,000$ ? (14,000)*

Use the Multiples of 1,000 C  display master as needed.

**Say:** *Let's move on to the product of 7 and 3,000. If we do not know the product of 7 and 3,000 automatically, we can continue with the strategy. Each time, we are adding 7 times 1,000, which is 7,000. We take the product of the previous fact, 14,000, and add 7,000. 7 times 3,000 is 21,000.*

Complete the table with students.

**Say:** *Now that we have completed the multiples of 1,000, what do all of the products have in common? What relationship do you see between the factors and the product? (all products end in three 0s; you can multiply 7 and the digit in the thousands place and then add three 0s to get a product; etc.)*

Use the Multiples of 1,000 D  display master as needed.

**Say:** *What conclusions can we make from seeing the patterns in the table and multiplying by multiples of 10, 100, and 1,000? (guide students to the conclusions on the Conclusion  display master) From these patterns, what is the product of 4 and 300? (1,200) What is the product of 6 and 4,000? (24,000) What is the product of 5 and 50? (250)*

Use the Conclusion  display master as needed.



#### WATCH FOR

Some students may need a more concrete model showing how multiplying by powers of 10 works. If so, use base ten blocks to show 10, 100, and 1,000, as well as 20, 200, and 2,000. Show students how, in each place, the number in the second group is 2 times larger than the number in the first group: 2 is 2 times larger than 1, 20 is 2 times larger than 10, etc. The factor is always 2, and the number of 0s represents the other factor: 10, 100, or 1,000.

## Practice

For each practice activity, provide detailed feedback to students, highlighting what was done correctly and what needs improvement. Provide opportunities for students to correct their errors. Collect student work to review and monitor student progress.

**Activity 1:** Help students complete the activity on the Practice 1 handout.

**Activity 2:** Have students work in pairs to complete the activity on the Practice 2 handout.

## Independent Practice

1. Have students work independently to complete the activity on the Independent Practice handout.
2. Go over the answers (students self-check and correct, using a colored pencil).
3. Have students record the number correct in the box and complete their How Am I Doing? graph.
4. Collect the papers to review and monitor student progress.

## Closure

Review the key ideas. Have students provide examples from the lesson.

Have students discuss their answer to the following questions:

- How do you know how many 0s are in the product of a problem that has 10 as a factor? 100 as a factor? 1,000 as a factor?
- Why would you want to use this strategy to multiply numbers by a multiple of 100 or 1,000, instead of the standard algorithm you probably learned in class?

Clear up any misconceptions. Students who are unsure of the procedure associated with this strategy or do not know why it should be used could benefit from additional instruction.